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Website redesign and testing with a usability consultant: lessons learned

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Abstract

Purpose – The aim of this case study is to present one library's experiences consulting with a usability expert during the design and implementation phases of a new academic library website and the lessons learned during the process.

Design/methodology/approach – The library staff worked with the consultant so that he understood the work of the librarians and goals for the website. Together the consultant and library staff developed a series of tests to measure the usability of the site. The librarians implemented the tests, gradually taking the leadership role in the process.

Findings – The study confirms the value of usability testing as a tool to bring to light some of the ambiguities and complexities of a library website for users. The study demonstrates that librarians have developed an expertise and knowledge base that transfers well to the evaluation of websites and online resources. The experience of the University of Michigan AAE Library reveals that usability testing should be an ongoing exercise so that the website remains relevant to the users.

Practical implications – This study advises librarians of the value of testing and that, on the one hand, test results confirm what one imagines about the users' experiences, but on the other hand they reveal the unexpected strategies and understandings of the users.

Originality/value – This case study provides a useful example of the value of working with a usability expert, a discussion of what to expect during the process, and advice about the role of the librarian in such an endeavor.

Keywords Academic libraries, Worldwide web, Consultants, Content management

Paper type Case study



The redesign of the Art, Architecture & Engineering Library website involved participation and advice from many. The authors would like to acknowledge the expert contributions of Mike Elledge, Liene Karels, James Reed, and Ryan Steinberg. Phillip M. Edwards and Jeanie E. Fisher were formerly University Library Associates, Art, Architecture & Engineering Library, University of Michigan, Ann Arbor, Michigan, USA.

The experience of completely redesigning a complex website demonstrates the important role of usability testing. Usability testing raises the awareness of how a site is used and provides a model for periodic evaluation. The University of Michigan Art, Architecture & Engineering Library website (see www.lib.umich.edu/aael/) serves a diverse group of faculty, students, and scholars in Engineering, Architecture and Urban Planning, and Art and Design. The website brings together thousands of distinct, but often related, resources and services and aims to deliver them in a logical and easy-to-use manner. The driving goal of the website redesign was to move all the information on the site to a content management system (CMS). The comprehensive scope of the task provided an opportunity to test presumptions about vocabulary and the organization of information on the site, as well as a chance to implement several desired interactive features. Because the conversion from an HTML-based site to a CMS-driven site was such a fundamental change, it was felt that a usability component was essential. At this point initial contacts with the university's Usability and Evaluation Lab were made.

The Art, Architecture & Engineering (AAE) Library is located in the Duderstadt Center, a building dedicated to developing new ways of bringing technology into the research and learning process in the lab and classroom. Alongside the AAE Library, the Duderstadt Center houses consultation labs such as the Collaborative Technologies Lab, the Usability Support and Evaluation Lab, and the Instructional Technologies Lab, as well as several audio and visual labs, and event and performance spaces. The decision to work with the Usability Lab was made easy by the physical proximity of these labs and their staff to the library and its staff, in tandem with the missions of each group to work collaboratively to improve the technological understanding on campus. This case study will trace the process of the redesign and will address the AAE Library's experience working with the Usability Lab and its consultants on the implementation of the website.

Literature review

Several case studies have been published recently describing usability testing during the redesign of academic library websites. Tests of library websites usually include a set of structured tasks that provides a representative sample of the types of information users would want to find on the website. Typically one develops about six to 12 tasks to provide sufficient coverage of the information on the website, yet minimize the testing time (Battleson *et al.*, 2001; Fuller and Hinegardner, 2001; Mack *et al.*, 2004; McMullen, 2001). In addition to the tasks, usability tests often include a questionnaire covering the user's background and experience and inquiring about their impressions of the functionality of the website. Examples of the types of questions asked in library website usability tests can be found in Clark (2004), Fuller and Hinegardner (2001), and McMullen (2001).

The number of participants needed for a usability test is reasonably small. Most recently published usability studies in libraries tested between five and 14 participants (Augustine and Greene, 2002; Battleson *et al.*, 2001; Fuller and Hinegardner, 2001; Mack *et al.*, 2004; McMullen, 2001). Nielsen (2000) and Krug (2000) both discuss the benefits of testing with a smaller number of users. Nielsen (2000) shows that testing with five users should find approximately 85 percent of the problems, and that testing with 15 users should find 100 percent of the problems. Generally, it is more

cost-effective to test fewer people and have more tests than to test a lot of people just once (Krug, 2000; Nielsen, 2000).

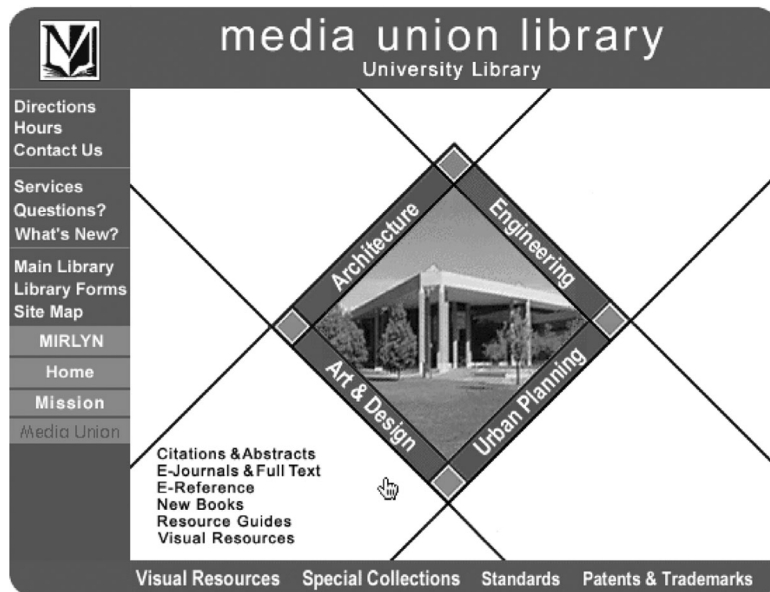
Battleson *et al.* (2001), Fuller and Hinegardner (2001), McMullen (2001), and Swanson (2001) describe some of the basic lessons learned from their tests. All of these studies concluded that usability testing was an extremely useful tool when redesigning websites, particularly in understanding how people use sites and in identifying confusing jargon. Augustine and Greene (2002) found that students relied on the search feature of the website rather than the structured hierarchy of the site.

Although much has been written about usability testing of library websites, very little has been written about consulting with usability experts when designing and implementing library usability studies. There is a growing literature available to inform librarians about usability testing, and the ASIS&T Information Science Education Committee reports that as of March 2003, 41 US and Canadian institutions offer course study in information architecture (ASIS&T, 2003). Many library and information science programs now offer training in information architecture, so that many librarians have the knowledge and skills to conduct usability tests. Nonetheless, there are advantages to consulting usability experts such as the time saved in self-education, the input of an expert's experience, and an unbiased viewpoint.

Two studies in particular refer to consulting usability experts in designing library websites. The most extensive of these studies is reported by The University of Texas General Libraries, where the staff first developed a redesign process for their website, and then employed a usability consultant firm (University of Texas General Libraries, 2001). The consultant evaluated their methods and offered recommendations on data collection, analysis and interpretation, and on making design recommendations for the site. The consultant also recommended using a trained usability engineer early in the planning process to help provide an efficient and effective usability-testing plan. Librarians at the University of Wisconsin Digital Collections Center (UWDCC) included two usability experts to help moderate and take detailed notes of an initial focus group session that was designed to uncover problems and offer suggestions about the Belgian-American Research Collection (Clark, 2004).

The redesign process

Consensus on the need to update the design and organization of the old AAE Library (formerly the Media Union Library) website and the shared desire to move to an open-source CMS instigated discussions about a new website. The team was necessarily large because of the need to include subject librarians representing the various disciplines served by the library, as well as circulation staff who better understood some of the services users expected. It was large also because there was no extra funding and the work would have to be done by many. The first step was to evaluate the existing HTML-based website, which had been in use since Summer 2000 (Figure 1). Although the old website had a simple, uncluttered look, the experiences of library staff indicated that users often had difficulty accessing information. It was agreed that the new site should provide more interactivity for the user, such as a search feature and a drop-down FAQ list, one with more content geared toward information literacy and instruction with less library lingo, and one that offered a stronger identity for the library. Whereas the old site required the user to choose a broad subject area to begin their search for resources, it was decided that the new site should have more



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Figure 1.
 Art, Architecture &
 Engineering Library
 (formerly the Media Union
 Library) website prior to
 redesign, showing rollover
 of Art & Design quadrant

ways to get into the resources. A review of other library websites helped illuminate the pros and cons of various approaches. Consultations with technology experts in the Library Web Services office about loading software and hosting the database on a library server helped in determining the required technology. Because of the magnitude of the change to the website, it was decided that usability testing should be part of the design and development process and not simply a step at the end.

The underlying and essential change to a CMS-driven website merits attention before discussing the usability component of the design process. Three principal reasons led the decision to use a CMS:

- (1) the ability to reuse material on the site and offer multiple ways for users to find content;
- (2) the flexibility for global updates to the site from changing a phone number or URL to redesigning a standard page layout; and
- (3) the relative ease of basic administration and content management for multiple authorized users.

The CMS would allow anyone on staff to make changes rather than requiring all changes to funnel through one local “webmaster”. While on the one hand daunting, the sense of ownership provided by the ability for all staff to participate in the site was enticing and was indicative of how the AAE Library functions.

The decision to use a CMS led to a review of several open-source solutions, ranging from database/form-driven systems to Wiki systems to blogging packages. None of these options met required needs “out of the box”. Being in the fortunate position of having several technologically savvy staff members, the staff realized it could most efficiently meet specific needs by creating its own basic CMS solution. MySQL was chosen for the underlying database and PHP, a popular scripting language designed for interacting with databases, was chosen for scripting. Both technologies are open-source, supported by Library Web Services, and relatively easy to learn.

Running the website out of a database eliminates the need for individual HTML files, as pages are served up dynamically via PHP scripts. The staff responsible for designing the database prepared separate scripts for displaying different categories of information, e.g. resources, persons, places, news and events; a script for presenting the results of a search; and a browsing script that displays the items that match a particular division subject. These scripts are constructed modularly, so that for example there is a header sub-script that renders the header of a page, and this sub-script is then referenced by all of the other scripts. This facilitates the ease of making global changes to the website by requiring that changes be made only once.

The back-end administration of the system utilizes PHP scripts as well. Authorized users can use any web browser to enter the administration system (Figure 2) and make changes to the database by use of standard forms. The main challenge in adopting this new system was the need for staff to re-conceptualize a website. Rather than thinking of a site as individual pages, one has to think of a database-driven website as

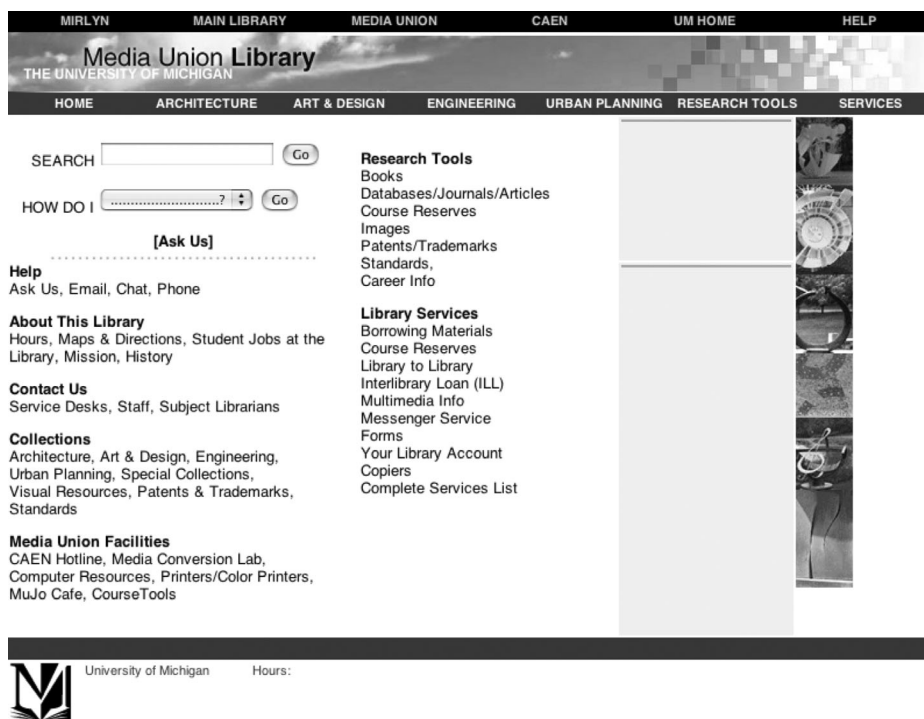


Figure 2.
Paper prototype home
page for Art, Architecture
& Engineering Library
(formerly the Media Union
Library)

dynamically related modules. While decidedly more powerful, such a website does not allow for infinite customization and trade-offs must be made to harmonize the structure of the website. This is particularly important in light of usability testing. Usability of the site was not just about one page or one feature it had to do with the entire site and its underlying structure, and it had to be addressed via the entire site.

Usability testing

The AAE Library website redesign project began by having a few library student assistants answer some commonly asked questions using the current site. This, combined with the library staff's experiences with the site, helped to identify major problems. With information obtained from these early, informal investigations, the AAE Library began working with the Usability Support and Evaluation Lab. Located just one floor below the library in the Duderstadt Center, the lab is a resource for University of Michigan faculty, staff, students and others interested in evaluating websites, web-based tools, and software. One consultant from the lab was assigned to the AAE Library project.

After listening to the needs of the library, the consultant from the Usability Lab proposed three options based on cost:

- (1) a free option suggesting a heuristic analysis and sector interviews preliminary to design;
- (2) a medium-range option which included a mix of analysis and testing before and during design; and
- (3) a more expensive option which suggested additional information architecture evaluation and prototype testing.

The mid-range option was chosen as the one that offered the best cost-benefit ratio. The path the library initially chose included the following series of tests:

- *heuristic analysis* – a review of the proposed website design for adherence to commonly accepted usability principles;
- *sector interviews* – in-depth interviews with library staff to help the consultant understand how the library website was used, and how it was perceived that students, faculty, and staff were using the website;
- *card sorting* – a usability exercise where individual users group, prioritize, and identify cards containing website content; this would help to develop the overall structure and language for the site; and
- *wire framing* – creating simplified versions of a particular website to evaluate the effectiveness of site navigation, language, and consistency.

Due to time constraints (work began in March and roll out of the new site was scheduled for August) the preliminary heuristic analysis was omitted and a simpler paper prototype test was conducted in place of the wire framing test. In addition to these tests, done with the aid of the usability consultant, the library conducted finished prototype testing of the site with students and staff at several stages during and after the design process.

Sector interviews

The usability consultant conducted sector interviews with four library staff members representing the major areas of library information on the website. Interviewees included the Art & Design librarian, the Architecture & Urban Planning librarian, one of the engineering librarians, and a staff member from Access Services (circulation and reserve). The interviews allowed the consultant to become familiar with the site's content and with library terminology. This information was used in the card sorting to create mostly jargon-free labels, except where the library jargon was meaningful to users. The interviews also highlighted the types of assistance requested from reference librarians, common activities of information-seeking patrons, and specialty services provided by libraries.

Card sorting

The card sorting exercise provided insight into how users expected the website content to be organized. The usability consultant prepared the card sort by taking terms from the top, second, and third level pages of the site in use. Library staff added a few additional terms that were not on the current site, but which provided some useful options for the test. This resulted in 54 cards. Six participants were recruited, including undergraduate and graduate students, and staff representing the different departments the library serves. The participants were asked to sort the cards into groups that made sense to them. They were then asked to label each of the groups of cards by writing an appropriate label on blank cards. The consultant directed the tests, while two library staff monitored. Upon completion of the testing, the consultant provided the library with the test data and a brief report on the results, including a proposed content grouping for the site.

The consultant based the content grouping on the similarities in how five of the participants organized the cards. (One participant's results were rejected because they differed so significantly from those of the other five.) The remaining five participants generally divided their cards into four content groups:

- (1) a library information and services group;
- (2) an information resources group;
- (3) a specialized resources group; and
- (4) a miscellaneous group.

The library information and services group included terms related to library information and policies, special services, reference assistance, and forms. The information resources group included terms related to databases, indexes, dictionaries, and image and video resources. The specialized resources group included patent information and dissertation resources. The final group included such items as useful links, building services, career information, and site map.

Paper prototype

Paper prototyping is a useful and efficient testing method for determining the effectiveness of proposed nomenclature, organization, and layout before implementation begins. For this test, paper prototypes were created of the home page (Figure 2) and a variety of lower level pages using the information on content

organization obtained from the card sorting test. Based on discussions with the consultant, ten tasks were created and divided into two sets – one set for participants from Aart and Architecture and one set for students from Engineering. This allowed tasks to be tailored somewhat to the participants' backgrounds, although each set of five tasks covered similar basic information needs such as circulation services, finding assistance and searching for library materials. In this testing phase, eight participants were recruited from a variety of departments and included undergraduate students, graduate students, and departmental staff. The usability consultant created the testing materials, which included raw data sheets and follow-up questionnaires for each task. The consultant talked to the participants during the testing and led them through the tasks and follow-up questions. A library staff member took notes on the raw data sheets, included time, path taken, problems encountered, and other observations. After all of the tests were completed, the usability consultant compiled the data and provided the library with a report on the results of this test.

AAE Library staff were impressed both by the unpredictability of the testers' strategies and by what was learned from participants' experiences. Participants were successful in completing all but one task, and completed most tasks in less than one minute. Interestingly, all of the participants found alternate paths from the optimal path to answer some questions. Some labeling choices created confusion while others received positive feedback: for example, the label "Borrowing Materials" caused confusion for most of the participants, as it did not suggest checking out books. As a result, this label has been changed to "Checking Out Books, etc.". The label "Your Library Account" also caused some confusion. Some participants liked this label, while others were looking for the term "My". Some participants also expected this kind of information to be located on the upper right of the web page like many commercial sites, such as Amazon.com. For the present, the label has been left as it is, and an additional "Your Account" link to the top right of the website has been included. The choice of the heading "Research Tools" over links to index databases and other information sources received favorable comments from a number of participants. Interestingly, this is a case where the library staff's knowledge of the AAE Library users was important in choosing the best terminology, despite the concerns of the usability consultant who felt that the term might prove too ambiguous.

Finished prototype and follow-up testing

When the website was completed, the AAE Library conducted a usability test on the finished prototype before public roll-out of the new site. The usability consultant was not actively involved in this test, but provided feedback during the preparation of the test and allowed use of the testing forms that had been provided during the previous test. For this test, seven tasks were devised that represented a typical range of information that AAE Library users would try to find on the website. Six participants were recruited for this test, including both graduate and undergraduate students from a variety of disciplines.

One and a half years after the redesign, another usability test was conducted using these same seven tasks. A new group of ten participants was recruited, including undergraduate students, graduate students, and a faculty member from a variety of disciplines. Some minor changes had been made since the implementation and follow-up testing would help determine the effectiveness of the site (Figure 3).

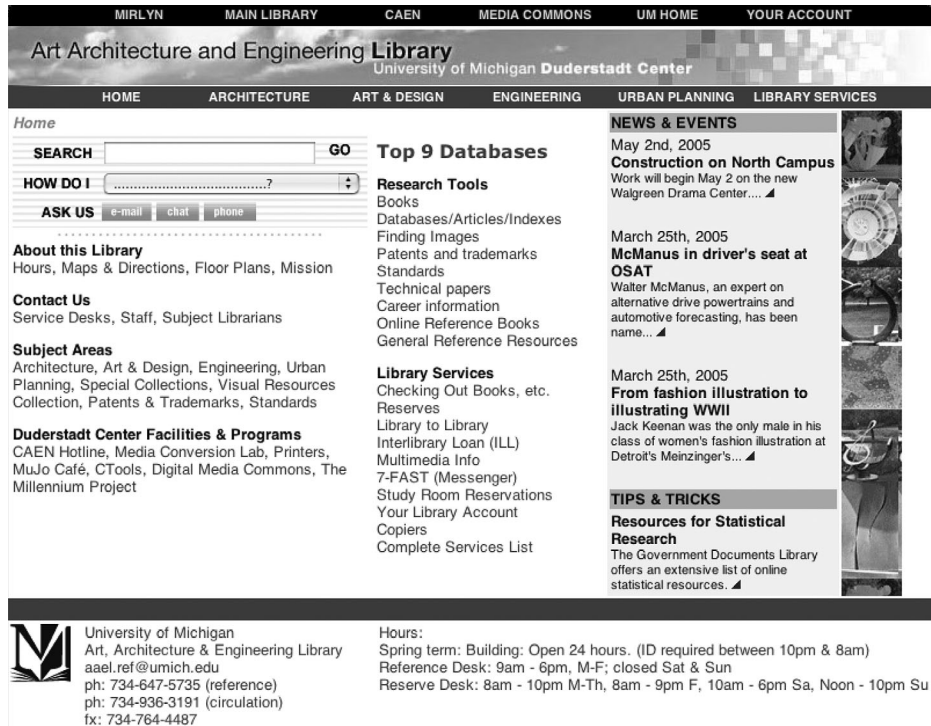


Figure 3.
Current Art, Architecture
& Engineering Library
home page

There were a number of differences noted between the first and second round of the testing. Interestingly, the users tested in the second round had a much harder time with a question about how to find the place where they could convert a video to digital format. Five of six testers in the first round got it right on the first try, whereas in the second round of testing seven of the ten users started off on the wrong path and six of those seven were unable to find the information on the website. The false starts of the second group may be a result of the fact that the first testers were familiar with the old site and were able to map that knowledge to the new site, or there could be another explanation. Because of the confusion of this terminology, this is an area that needs to be retested until an effective way to convey this information is found.

One interesting observation made between the first and second tests was the difference in the use of the search function. In the first round, only two of the six testers used the search function, and only on two tasks, whereas in the second round of testing, seven of the ten testers used the search function on at least one task, with two users opting to use the search function more frequently. Unfortunately, most users did not understand that they were searching the library website, rather than the entire web or the library catalog. The high and often ineffective use of the search function shows the need for a search feature and indicates that its scope needs to be clearly identified.

Conclusions: working with usability consultants

Working with the Duderstadt Center's Usability Support and Evaluation Lab allowed the AAE Library to take advantage of local experts and helped ensure that the website redesign would be functional and useful for patrons. Expectations that the consultants would bring knowledge and experience beyond the library setting and provide an unbiased viewpoint were met, although it was necessary to work closely and communicate often with the consultant. While the consultant was an expert in usability tests, it soon became apparent that the librarians were the experts when it came to understanding the content and to knowing what users needed. With this realization, the librarians took a leading role in determining the content for the tests and with the help of the usability consultant, created a testing structure that is reusable. Assuming a partnership role in the testing process brought results that were relevant, and that led to a substantive understanding of the dynamics of the website.

Given the increasing importance of a library's web presence and the multitude of electronic resources through which users must navigate, it is important for librarians to appreciate the value of usability testing, and using a professional usability consultant may provide a valuable foundation. As the AAE Library moves into the future, website usability testing will be repeated periodically and changes will be made to the site as needed by our users and as permitted by the CMS structure. The AAE Library exists within a cluster of four satellite libraries, and the site will next come up for a complete overhaul in two years, and by then the main library anticipates implementing a library-wide CMS system. At that point the library staff will evaluate how best to approach needed changes given the new library web environment. The lessons learned with the usability lab, to listen to users by testing the site and to trust librarians' instincts and expertise, will guide development in the next stage.

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